

REMARKS

Pursuant to the present amendment, claim 3 has been canceled and claim 1 has been amended. Thus, claims 1-2 and 4-37 are pending in the present application. No new matter has been introduced by way of the present amendment. Reconsideration of the present application is respectfully requested.

In the Office Action, claims 1 and 4-7 were rejected under 35 U.S.C. § 102(b) as allegedly being anticipated by Kleinknecht (U.S. Patent No. 4,188,123). Claim 2 was rejected under 35 U.S.C. § 103 as allegedly being unpatentable over Kleinknecht. Claims 3 and 8-37 were rejected under 35 U.S.C. § 103 as allegedly being unpatentable over Kleinknecht in view of Kotani (U.S. Patent No. 5,105,362). Applicant respectfully traverses the Examiner's rejections.

As an initial matter, it should be noted that claim 1 has been amended to re-present dependent claim 3 in independent form. Thus, by virtue of this amendment, the Examiner's rejections under 35 U.S.C. § 102 are rendered moot. However, it should be understood that, by virtue of the present amendment, Applicant does not acquiesce in the correctness of the Examiner's position. Rather, Applicant specifically reserves the right to pursue the subject matter defined in, for example, original independent claim 1 in a later filed application should he so desire.

In view of the foregoing, it is believed that all pending claims stand rejected under 35 U.S.C. § 103. As shown more fully below, Applicant respectfully submits the Section 103 rejections are improper. As the Examiner well knows, to establish a *prima facie* case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. Second,

there must be a reasonable expectation of success. Finally, the prior art reference (or references when combined) must teach or suggest all the claim limitations. The teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art, and not based on applicant's disclosure. *In re Vaeck*, 947 F.2d 488, 20 U.S.P.Q.2d 1438 (Fed. Cir. 1991); M.P.E.P. § 2142. Moreover, all the claim limitations must be taught or suggested by the prior art. *In re Royka*, 490 F.2d 981, 180 U.S.P.Q. 580 (CCPA 1974). If an independent claim is nonobvious under 35 U.S.C. § 103, then any claim depending therefrom is nonobvious. *In re Fine*, 837 F.2d 1071, 5 U.S.P.Q.2d 1596 (Fed. Cir. 1988); M.P.E.P. § 2143.03.

With respect to alleged obviousness, there must be something in the prior art as a whole to suggest the desirability, and thus the obviousness, of making the combination. *Panduit Corp. v. Dennison Mfg. Co.*, 810 F.2d 1561 (Fed. Cir. 1986). In fact, the absence of a suggestion to combine is dispositive in an obviousness determination. *Gambro Lundia AB v. Baxter Healthcare Corp.*, 110 F.3d 1573 (Fed. Cir. 1997). The mere fact that the prior art can be combined or modified does not make the resultant combination obvious unless the prior art also suggests the desirability of the combination. *In re Mills*, 916 F.2d 680, 16 U.S.P.Q.2d 1430 (Fed. Cir. 1990); M.P.E.P. § 2143.01. The consistent criterion for determining obviousness is whether the prior art would have suggested to one of ordinary skill in the art that the process should be carried out and would have a reasonable likelihood of success, viewed in the light of the prior art. Both the suggestion and the expectation of success must be founded in the prior art, not in the Applicant's disclosure. *In re Vaeck*, 947 F.2d 488, 20 U.S.P.Q.2d 1438 (Fed. Cir. 1991); *In re O'Farrell*, 853 F.2d 894 (Fed. Cir. 1988); M.P.E.P. § 2142.

Applying these legal standards, it is respectfully submitted that all pending claims are in condition for immediate allowance. Pursuant to the present amendment, independent claim 1 has been amended to include the step of creating a library comprised of a plurality of calculated trace profiles of implant regions having varying implant profiles. As set forth in the specification at page 10, calculated profile traces associated with a particular implant profile or characteristic may be calculated using Maxwell's equations and rigorous coupled wave analysis (RCWA) for a variety of, if not all, possible combinations of implant profiles readily anticipated by the design process. As thus understood, it is respectfully submitted that neither Kleinknecht nor Kotani, nor any other art of record, disclose the entirety of the steps set forth in amended independent claim 1. More specifically, none of the art of record discloses the step of creating a library comprised of a plurality of calculated trace profiles of implant regions having varying implant profiles.

In rejecting original dependent claim 3 (which has now been re-presented as amended independent claim 1), the Examiner asserted that Kotani disclosed the step of providing a library comprised of a plurality of calculated profiles of implant regions having varying implant profiles (citing col. 1, ll. 2-25, col. 3, l. 5 – col. 4, l. 5 and col. 4, l. 53 – col. 5, l. 5). Applicant respectfully disagrees. The undersigned has reviewed the passages from Kotani cited by the Examiner and can find no support for the Examiner's assertion that Kotani discloses this limitation.

As understood by the undersigned, Kotani is directed to a system for managing production of semiconductor devices. Col. 1, ll. 11-15. Kotani discloses that a typical production line is comprised of a plurality of production apparatus 11a and a plurality of inspection apparatus 11b. The production apparatus 11a perform various processes on successive semiconductor wafers, while the inspection apparatus 11b inspect partially finished

products which have been prepared by the production apparatus. Col. 1, ll. 19-33. Kotani further notes that in a conventional production line, the production apparatus and the inspection apparatus are allowed to operate independently regardless of errors and malfunctions in the production apparatus and the inspection apparatus. Col. 1, ll. 61-66.

To alleviate such problems, Kotani discloses a system comprised of a central processing unit 12 which performs real-time, on-line control of the production apparatus and the inspection apparatus. Col. 3, ll. 18-20. The processing managing system disclosed in Kotani is comprised of three blocks. The first block 10 is a processing managing area which manages the various processes performed by the production apparatus and the various inspections performed by the inspection apparatus. Col. 3, ll. 40-44. The second block 20 is a data accumulation area which is connected to the process managing means 10. The data accumulation means 20 accumulates and stores various data which have been acquired over a long time such as the results of processes or inspections conducted in the production line, data obtained through various tests conducted by an external evaluation system and the like. Col. 3, l. 57 – Col. 4, l. 5. The data accumulation means 20 provides for reference to the accumulated data as well as for statistical computation using such data. The third block 20 of the system disclosed in Kotani is a simulation area. The simulation means 30 simulates the operation or characteristics of the semiconductor devices produced by the semiconductor production line on the basis of the data stored in the data accumulation means 20. Col. 4, ll. 12-16. The simulation means 30 further determines optimum conditions for subsequent processes to be performed and delivers the data for those optimum conditions to the process managing means 10. Col. 4, ll. 16-19. The simulation means 30 can perform process simulations, device simulations and circuit simulations. Col. 4, ll. 19-31.

At no point does Kotani disclose at least the step of providing a library comprised of a plurality of calculated trace profiles for implant regions having varying implant profiles. Such a limitation is simply not disclosed in Kotani. In fact, it is hard to understand how any of the disclosure of Kotani could be construed as a disclosure of this limitation. Thus, any obviousness rejection of claim 1 based upon the combination of Kleinknecht and Kotani would be improper as the combination of such art would lack at least this limitation. Moreover, there is simply no suggestion in Kleinknecht or Kotani to modify these teachings so as to arrive at the invention defined by amended independent claim 1. In view of the foregoing, it is respectfully submitted that amended independent claim 1, and all claims depending therefrom, are not obvious in view of the art of record, and therefore allowable.

It is also respectfully submitted that independent claim 8 is likewise allowable over the art of record. Claim 8 requires, among other things, forming a plurality of implant regions in a semiconducting substrate, illuminating and measuring light reflected off the substrate to generate a profile trace for the implant regions, comparing the generated profile trace to a target profile trace, and modifying, based upon a deviation between the generated profile trace and the target profile trace, at least one parameter of an ion implant process used to form implant regions on subsequently processed substrates. In rejecting claim 8, the Examiner asserted that Kotani shows the steps of comparing the generated profile trace to a target profile trace and modifying based upon a deviation between the generated profile trace and the target trace at least one parameter of an ion implant process used to form implant regions on subsequently processed substrates (citing col. 1, ll. 22-25, col. 3, l. 57 – col. 4, l. 5 and col. 5, ll. 14-32). Office Action at p. 4. Applicant respectfully disagrees.

Kotani is understood to be a system and method for predicting the effectiveness of processes and treatments that are yet to be performed on substrates to manufacture semiconductor devices:

“Then, the simulation CPU 31 simulates the subsequent production processes for semiconductor devices by employing the actual data of the processes which have already been performed and the process flows for the following processes which are yet to be performed. In consequence, it is possible to predict, before all the remaining processes and treatments are completed, the operation and characteristics of the semiconductor devices which are to be obtained when all processes and treatments are carried out according to the program. The result of the simulation is accumulated in the data base 32 and is displayed as desired on the CRT 33.

“In the event that the characteristics of the simulator semiconductor device are not acceptable, the conditions of the processes and treatments which are to be subsequently carried out are varied in accordance with the statistical data computed by the data accumulation means 20, and the simulation is executed once again with varied conditions, whereby the conditions of the processes which are to be subsequently performed are optimized for the production of the semiconductor devices having the desired operational characteristics.”

Col. 5, ll. 20-42 (emphasis added). As thus understood, it is respectfully submitted that the methodology defined by independent claim 8 is not obvious in view of Kleinknecht or Kotani, or any other art of record. More specifically, Kotani is directed to a forward looking methodology that involves potentially modifying downstream process recipes based on an analysis of data obtained regarding substrates that were previously subjected to other process operations. In effect, the methodology disclosed in Kotani attempts to predict future results for a planned processing scheme and modify that processing scheme (or parameters thereof) if the predicted results are unacceptable.

In stark contrast, independent claim 8 is directed to a process whereby implant regions are illuminated and measured and the generated profile trace is compared to a target profile trace. Thereafter, independent claim 8 requires modifying, based upon a deviation between the generated profile trace and the target profile trace, at least one parameter of an ion implant

process used to form implant regions on subsequently processed substrates. In short, claim 8 involves a feedback type of control wherein at least one parameter of an ion implant process used to form implant regions on subsequently processed substrates is modified if there is a deviation between the generated profile trace and the target profile trace. At no point does Kotani disclose the steps of generating and comparing a profile trace for a plurality of implant regions and comparing the generated trace to a target trace. Moreover, Kotani does not disclose or suggest the step of modifying at least one parameter of an ion implant process to be performed on subsequently processed substrates if there is a deviation between these generated trace and the target trace. Again, it is believed that a fair reading of Kotani leads to the inescapable conclusion that this limitation is not disclosed or suggested in Kotani. For at least these reasons, it is respectfully submitted that independent claim 8 is allowable over the art of record.

Dependent claim 12 is believed to be independently allowable for many of the reasons set forth with above respect to independent claim 1 set forth above.

Independent claim 16 is believed to be allowable for many of the reasons set forth above with respect to claim 1, *i.e.*, independent claim 16 requires the step of comparing the generated profile trace to a calculated profile trace in a library. As indicated above with respect to claim 1, it is believed that none of the art of record cited by the Examiner discloses the step of use of such a calculated profile trace.

Similarly, independent claim 24 is believed to be allowable for many of the reasons set forth above with respect to independent claim 8. Accordingly, it is believed that independent claim 24, and all claims depending therefrom, are in condition for immediate allowance.

Independent claim 31 is also believed to be allowable for many of the reasons set forth above with respect to claim 8.

In view of the foregoing, Applicant respectfully submits that any attempt to assert that the inventions defined in the pending claims are obvious in view of Kleinknecht and Kotani, or any other art of record, must necessarily involve an improper use of hindsight using Applicant's disclosure as a roadmap. A recent Federal Circuit case makes it crystal clear that, in an obviousness situation, the prior art must disclose each and every element of the claimed invention, and that any motivation to combine or modify the prior art must be based upon a suggestion in the prior art. *In re Lee*, 61 U.S.P.Q.2d 143 (Fed. Cir. 2002). Conclusory statements regarding common knowledge and common sense are insufficient to support a finding of obviousness. *Id.* at 1434-35.

In view of the foregoing, it is respectfully submitted that all pending claims are in condition for immediate allowance. The Examiner is invited to contact the undersigned attorney at (713) 934-4055 with any questions, comments or suggestions relating to the referenced patent application.

Respectfully submitted,

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